Comparison and correlation between serum bilirubin and transcutaneous bilirubin in NICU Bidar

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Abstract
Background: Hyperbilirubinemia is one of the most common problem in neonates. An estimation of the bilirubin value is essential for decision making in jaundiced babies. Transcutaneous bilirubin screening is a quick, non invasive technique to measure bilirubin levels in neonates. The objective of this study was to evaluate the TcB and analyze the correlation with serum bilirubin values and find out whether TcB measurement could avoid invasive serum bilirubin measurements. **Material and methods:** this is a prospective study conducted in BRIMS Bidar for a period of one year from June 2016 to June 2017. A total of 210 cases are enrolled in the study. Babies admitted to NICU for various reasons who developed jaundice during the stay are included. Inclusion criteria is babies from day 1 to day 28. Babies more than 28 days and less than 28 weeks of gestation are excluded. Transcutaneous bilirubin measurement was done using the bilirubin meter (dragger JM 103) and simultaneously a serum sample for bilirubin was done before starting phototherapy. **Results:** there is a close correlation between serum bilirubin and transcutaneous bilirubin measurement. It was observed that r value for serum bilirubin and transcutaneous bilirubin for different age group, different weight group, and gestational ages are significant. **Conclusion:** the study demonstrates clearly that there is a good correlation between the TcB and serum bilirubin levels. The TcB meter can be used for measurement of bilirubin levels in NICU non-invasively.
Key words: transcutaneous bilirubin, total serum bilirubin, transcutaneous jaundice meter.

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INTRODUCTION

Neonatal hyperbilirubinemia is a common clinical problem in newborn babies. Common causes of NNHB are physiological jaundice, abo incompatibility, preterm babies, and rhincompatibility. Evaluation of jaundice in newborn is most essential and frequently needed investigation for assessment and treatment of jaundice adequately. For this we require serum bilirubin levels. for this blood sample has to be collected regularly. A new device called transcutaneous bilirubinometer is available, which isnon-invasive procedure. And easy method to assess the Jaundice in newborn. So this study is done to compare and correlate between serum bilirubin and transcutaneous bilirubin levels.

MATERIAL AND METHODS

This study is done in SNCU/NICU BRIMS Bidar. For a period of one year from 2016 June to 2017 June. A total of 200 cases were collected. Inclusion criteria- all newborn babies admitted in NICU age less than 28 days and gestational age of more than 28 weeks were included in the study.
Exclusion Criteria: Babies of less than 28 weeks and less than 1 kg were excluded.
Babies who developed jaundice during NICU stay were included in the study and blood sample was sent for serum bilirubin and simultaneously TcB measurement was done before starting phototherapy. Data were

collected and analyzed for serum bilirubin and transcutaneous bilirubin by correlation coefficient (r value). TcB measurement was done with jaundice meter (dragger JM 103) and serum levels were done in the central lab with standard procedure.

Written consent was taken before sending the blood sample and counseling was done to attenders.
Statically Analysis: Correlation coefficient (r value).

RESULTS

Table 1: Age and sex wise distribution of cases

Age (days)	Males		Females		Total	
	No.	%	No.	%	No.	%
1—3 days	31	27.4	34	35.0	65	30.9
4—6 days	53	46.9	42	43.3	95	45.2
7—14 days	26	23.0	20	20.6	46	21.9
≥ 15days	3	2.7	1	1.1	4	2.0
Total	**113**	**100.0**	**97**	**100.0**	**210**	**100.0**
Mean ± SD	**5.25 ± 2.80**		**4.82 ± 2.33**		**5.03 ± 2.60**	
Test value	**t = 1.289**				**--**	

In this study neonates from D1 to 28 days were included. Out of 200 cases 103 are males and 97 are female babies. Maximum cases are in 4 to 6 days age group (45%). The sex ratio inthis study is 1.16:1 Bar diagram.
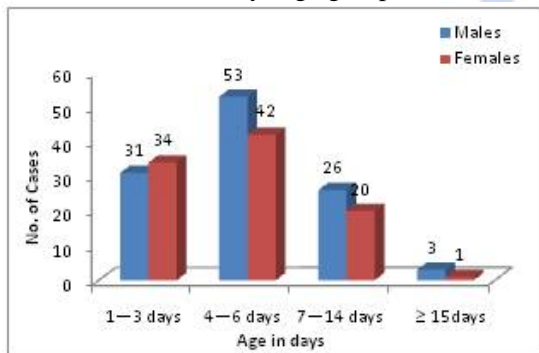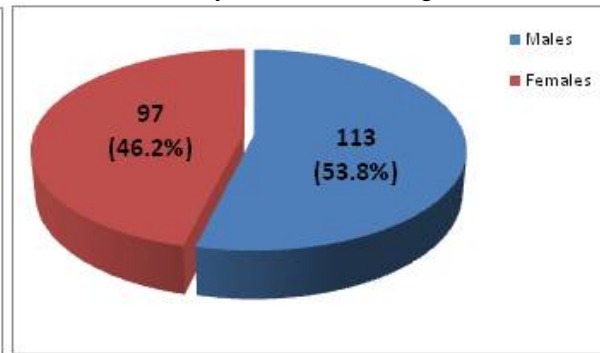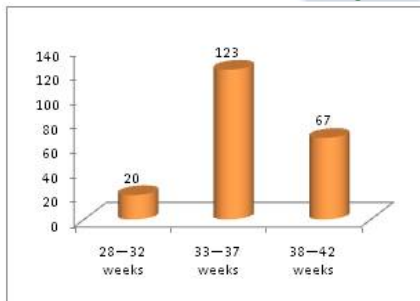

Figure 1

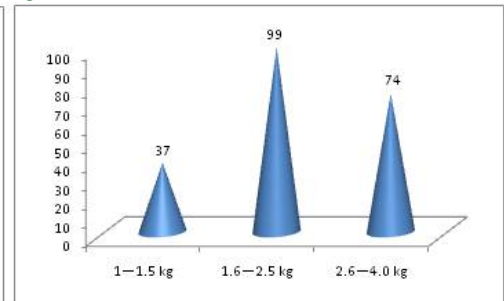**Figure 2**

Figure 3

Figure 4

Figure 5

Legend
Figure 1: Multiple bar diagram represents age and sex wise distribution of cases; **Figure 2:** Pie diagram represents sex wise distribution of patients; **Figure 3:** Simple bar diagram represents gestational age wise distribution; **Figure 4:** Simple bar diagram represents birth weight wise distribution; **Figure 5:** Simple bar diagram represents Mean values of serum bilirubin and transcutaneous bilirubin

Table 2: Gestational age wise distribution of the cases

Gestational age (weeks)	Number of cases	Percentage
28—32 weeks	20	9.5
33—37 weeks	123	58.5
38—42 weeks	67	32.0
Total	**210**	**100.0**
Mean ± SD	**35.83 ± 2.45**	**---**

Maxiumum number of cases are between 33-37 weeks of GA.123 cases with 58.5%. Followed by the GA of 38 to 42 weeks (67 cases and 32.%).

Table 3: Birth weight wise distribution of cases

Weight in Kgs	Number of cases	Percentage
1—1.5 kg	37	17.6
1.6—2.5 kg	99	47.1
2.6—4.0 kg	74	35.3
Total	210	100.0
Mean ± SD	2.31 ± 0.63	---

Maxium cases were seen between 1.6-2.5 kg weight (99 cases, 47.1%) Followed by 2.6to 4 kg (74 cases and 35.3%)

Table 4: Correlation between serum bilirubin and TcB

Variables	Mean ± SD	Correlation Confident value	P value and Significance
Serum bilirubin	14.7 ± 3.25	r = 0.747	P<0.01 Significant positive correlation
Transcutaneous bilirubin	15.96 ± 3.23		

The correlation coefficient between serum bilirubin and transcutaneous bilirubin was r = 0.747 P<0.01 significant positive correlation.

Table 5: Correlation between serum bilirubirn and TcB withreferrance to age wise distribution

Age (days)	Serum bilirubin Mean ± SD	Transcutaneous bilirubin Mean ± SD	Correlation Confident value	P value and Significance
1—3 days	14.23 ± 3.55	15.56 ± 3.38	r = 0.747	P<0.01 Significant positive correlation
4—6 days	14.79 ± 2.98	16.05 ± 3.02	r = 0.698	P<0.01 Significant positive correlation
≥ 7 days	15.20 ± 3.19	16.37 ± 3.32	r = 0.715	P<0.01 Significant positive correlation
ANOVA Test value	F = 1.298	F = 0.924		-

R value (correlation coefficient) between different age groups is shown in the above table, age Group between 1-3 days – r value is 0.747 which is significant Group between 4-6 days – r value is 0.698 which is significant Age group> 7 days – r value is 0.715 which is significant. P value is < 0.01 for all the age groups in this study. which shows significant.

Table 6: Correlation between serum bilirubin and TcB with refer to gestational age group

Gestational age (weeks)	Serum bilirubin Mean ± SD	Transcutaneous bilirubin Mean ± SD	Correlation Confident value	P value and Significance
28—32 weeks	14.89 ± 3.30	16.39 ± 2.85	r = 0.691	P<0.01 Significant positive correlation
33—37 weeks	14.38 ± 3.25	15.65 ± 3.29	r = 0.743	P<0.01 Significant positive correlation
38—42 weeks	15.25 ± 3.21	16.44 ± 3.11	r = 0.763	P<0.01 Significant positive correlation
ANOVA Test value	F = 1.592	F = 1.493	-	-

GA of 28-32 weeks showed r value of 0.691 which is significant. GA of 33-37 weeks showed r value of 0.743. GA of 38 to 42 weeks showed r value of 0.763. All these are significant. P value is < 0.01 in all the GA. Which is significant.

Table 7: Correlation coefficient between serum and TcB with reference to weight of the babies

Weight in Kgs	Serum bilirubin Mean ± SD	Transcutaneous bilirubin Mean ± SD	Correlation Confident value	P value and Significance
1—1.5 kg	14.70 ± 2.99	16.35 ± 2.79	r = 0.708	P<0.01 Significant positive correlation
1.6—2.5 kg	14.38 ± 3.34	15.61 ± 3.35	r = 0.751	P<0.01 Significant positive correlation
2.6—4.0 kg	15.15 ± 3.16	16.28 ± 3.20	r = 0.755	P<0.01 Significant positive correlation
ANOVA Test value	F = 1.180	F = 1.212	-	-

Babies with weight between 1-1.5 kg – r value is 0.708 Babies with weight 1.6-2.5 kg - r value is 0.751. Babies with weight 2.6 – 4 kg – r value is 0.755. All above weight groups showed significant r value. P value is <0.01 in all the weight groups which is significant.

DISCUSSION

The study reveals that maximum age of patient was 18 years and minimum age was 1 day. Maximum number of patients 95 (45.2%) belongs to the age group of 4—6 days and Minimum number of patients 4 (2.0%) in the age group of ≥ 15 days of age The mean and SD of males age was 5.25 ± 2.80 and the mean and SD of females was 4.82 ± 2.33. The overall mean age of patients was 5.03 ± 2.60 There was no statistically significance difference of age among males and females (P>0.05) The sex ratio of Male to Female in the study was 1.16: 1

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